

**CLAIMS:**

1. A method for marking an article to allow its identification or authentication comprising applying to the article a unique sequence of patterns, including invisible photoluminescent patterns, wherein each pattern has a position in the sequence, and each invisible photoluminescent pattern is characterized by at least one excitation wavelength, at least one emission wavelength, and at least one time delay, such that upon irradiation with light of the excitation wavelength said pattern emits light of the emission wavelength, and upon stoppage of said irradiation said pattern continues to emit light for a time delay, and at least two of said photoluminescent patterns have mutually different excitation wavelengths and/or time delays.
2. A method according to claim 1 wherein at least two of said photoluminescent patterns have mutually different excitation wavelengths.
3. A method according to claim 1 wherein at least two of said photoluminescent patterns have mutually different time delays.
4. A method according to any one of claims 1 to 3 wherein said invisible photoluminescent patterns are not detectable to the human eye under any lighting conditions.
5. A method according to claim 4 wherein said invisible photoluminescent patterns have both excitation and emission wavelengths out of the visible range.
6. A method according to claim 4 wherein the absorption of visible light by said invisible patterns is the same as that of their background and the emission wavelengths of said invisible photoluminescent patterns are out of the visible range.
7. A method according to claim 1 wherein said patterns are of simple geometric shapes.
8. A method according to claim 5 wherein said patterns have shapes selected from squares, rectangles, triangles, and circles.
9. A method according to claim 6 wherein said patterns are rectangular strips.

- 10.** A method according to any one of the preceding claim, wherein said unique sequence of patterns include non-luminescent patterns.
- 11.** A method according to any one of the preceding claims wherein said patterns are adjacent to each other to compose a string.
- 12.** A method according to any one of the preceding claims, wherein at least two of said patterns have overlapping positions.
- 13.** A method according to any one of the preceding claims, wherein all said patterns have overlapping positions.
- 14.** A method according to any one of the preceding claims wherein said invisible photoluminescent patterns are applied to the article by printing.
- 15.** A method according to claim 14 wherein said printing is selected from ink jet printing, laser toner printing, thermal printing, thermal transfer printing, impression printing, offset printing, flexo printing, screen printing, gravure printing, and intaglio printing.
- 16.** An authentication method, for authenticating an article having a unique sequence of patterns, including invisible photoluminescent patterns, wherein each pattern has a position in the sequence, and each invisible photoluminescent pattern is characterized by at least one excitation wavelength, at least one emission wavelength, and at least one time delay, such that upon irradiation with light of the excitation wavelength said pattern emits light of the emission wavelength, said emission continues for a time delay after stoppage of said irradiation, and at least two of said photoluminescent patterns have mutually different excitation wavelengths and/or time delays, the method comprising:

  - (i) providing an authentication sequence including positions in the sequence that are each characterized by an excitation wavelength, an emission wavelength, and a time delay, at least two of said excitation wavelengths and/or time delays being mutually different;
  - (ii) irradiating each of the invisible photoluminescent patterns composing the unique sequence of patterns marked on said article with a light beam having a wavelength identical to the excitation

wavelength characterizing a position in the authentication sequence that corresponds to the position of the irradiated invisible photoluminescent pattern in the unique sequence;

(iii) detecting wavelengths of light emitted by each of said invisible photoluminescent patterns to obtain a sequence of emission wavelengths; and

(iv) comparing the sequence of emission wavelengths obtained in (iii) with the emission wavelengths of the authentication sequence provided in (i) to determine if the article is authentic or not.

**17.** A method according to claim 16 wherein in (iv) it is determined that the article is authentic if the compared sequences are identical and not authentic otherwise.

**18.** A method for identifying an identity of an article having a unique sequence of patterns, including invisible photoluminescent patterns, wherein each pattern has a position in the sequence, and each invisible photoluminescent pattern is characterized by at least one excitation wavelength and at least one emission wavelength, such that upon irradiation with light of the excitation wavelength said pattern emits light of the emission wavelength, and at least two of said photoluminescent patterns have mutually different excitation wavelengths, the method comprising:

(i) providing a plurality of authentication sequences, each associated with a certain article identity, and each including positions in the sequence that are each characterized by an excitation wavelength and an emission wavelength, at least two of said excitation wavelengths being mutually different;

(ii) repeating (1), (2), and (3) as recited below one or more times, each time with another of the authentication sequences provided in (i) until said authentication sequence is found to correspond to the unique sequence of the article, and

(iii) identifying the article as having the identity associated with the authentication sequence that was found to correspond to the unique sequence of the article; wherein (1), (2), and (3) referred above are as follows:

- (1) irradiating each of the invisible photoluminescent patterns composing the unique sequence marked on said article with a light beam having a wavelength identical to the excitation wavelength characterizing a position in the authentication sequence that corresponds to the position of the irradiated invisible photoluminescent pattern in the unique sequence;
- (2) detecting wavelengths of light emitted by each of said invisible photoluminescent patterns to obtain a sequence of emission wavelengths; and
- (3) comparing a sequence of emission wavelengths obtained in (i) with the emission wavelengths of the authentication sequence provided in (2).

19. An article having a unique sequence of patterns, including invisible photoluminescent patterns, wherein each pattern has a position in the sequence, and each invisible photoluminescent pattern is characterized by an excitation wavelength and an emission wavelength, such that upon irradiation with light of the excitation wavelength said pattern emits light of the emission wavelength, and at least two of said photoluminescent patterns have mutually different excitation wavelengths.

20. An article according to claim 16 wherein said invisible photoluminescent patterns are not detectable to the human eye under any lighting conditions.

21. An article according to claim 19 wherein said invisible photoluminescent patterns have both excitation and emission wavelengths out of the visible range.

22. An article according to claim 19 wherein the absorption of visible light by said invisible patterns is the same as that of their background, and the emission

wavelengths of said invisible photoluminescent patterns are out of the visible range.

**23.** An article according to claim 17 wherein said patterns are of simple geometric shapes.

**24.** An article according to claim 23 wherein said patterns have shapes selected from squares, rectangles, triangles, and circles.

**25.** An article according to claim 24 wherein said patterns are rectangular strips.

**26.** An article according to claim 17, wherein said unique sequence of patterns include non-luminescent patterns.

**27.** An article according to claim 17 wherein said patterns are adjacent to each other to compose a string.

**28.** An article according to claim 17, wherein at least two of said patterns may have overlapping positions.

**29.** An article according to claim 17, wherein all of said patterns have overlapping positions.

**30.** An article according to claim 17 wherein said invisible photoluminescent patterns are applied to the article by printing.

**31.** A method for the preparation of an article according to claim 31 wherein said printing is selected from ink jet printing, laser toner printing, thermal printing, thermal transfer printing, impression printing, offset printing, flexo printing, screen printing, gravure printing, and intaglio printing.